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DC

TECHNICAL MEMORANDUM

Utah Coal Regulatory Program

September 13, 2011

TO: Internal File

THRU: Daron Haddock, Coal Program Manager DRH

FROM: Steve Christensen, Environmental Scientist SC

RE: Revised Reclamation Plan DO-10A, Genwal Resources, Inc., Crandall Canyon Mine, C/015/0032, Task #3881

SUMMARY:

On July 28th, 2011, the Division of Oil, Gas and Mining (the Division) received an amendment to the Crandall Canyon Mining and Reclamation Plan (MRP). The amendment was submitted as per Division requirements under Division Order DO-10A. The amendment makes the following assumptions:

1) The plan assumes that mine water will continue to discharge indefinitely from the mine, but that it will not need to be treated for iron. As such, the plan assumes that the existing mine-water treatment system will be removed during final reclamation and that the highwall area (where the treatment system is currently located) will be reclaimed to approximate original contour. Additionally, the plan addresses the seep water that currently discharges from the highwall sandstone ledge. The plan proposes the use of a backdrain system to capture the seep water and ensure the stability of the reclaimed slope.

2) The amendment also revises the reclamation plan to address the upper portion of the pad that will remain un-reclaimed due to the Emery County Crandall Canyon Memorial.

It should be noted that the existing reclamation plan calls for the re-establishment of the approximate original contour in the highwall area (as the amendment discusses as well). The significant difference in the recently submitted reclamation plan versus the existing plan is the mine-water that is discharging from the portals. Division Order DO-10A directed the Permittee to provide a final reclamation plan that takes the discharge into account. Historically, the flow values provided by the Permittee have averaged approximately 500 gallons per minute (gpm). However, mine-water discharge flows have been recorded over 1,000 gpm.

The following memo provides the technical analysis of the amendment relative to the hydrologic requirements of the State of Utah R645-Coal Mining Rules. The memo should not be approved at this time. The following deficiencies must be addressed prior to final approval:

R645-301-742.300- The Permittee must provide additional narrative, design information and design drawings that address how the mine-water discharge reclamation ditch (MD-1) and associated culvert (MC-1) will only accept mine-water discharge as indicated on page 8 of Appendix 5-22. From the information provided, it's unclear how additional storm-water runoff generated upland from the structures would be prevented from entering the channel and culvert conveyance system.

R645-301-742.300- The Permittee must demonstrate that the 10-year, 6-hour design storm event is adequate in sizing reclamation ditch MD-1 and culvert MC-1. The 10-year, 6-hour design storm corresponds to 1.56 cfs or 700.4 gpm. The amendment indicates that the maximum flow of the mine-water discharge is approximately 700 gpm. However, Division records indicate that mine-water discharges have exceeded 1,000 gpm. The Permittee must address this discrepancy.

R645-301-744.100- The Permittee must provide additional narrative, design information and design drawings for the discharge structure of the lower-most segment of reclamation ditch MD-1. Discharge structures must be designed to reduce erosion and prevent deepening or enlargement of stream channels. It's unclear from the information provided how the mine-water discharge will ultimately report to Crandall Creek (i.e. how MD-1 will tie into Crandall Creek without producing a scouring effect or additional erosion).

TECHNICAL ANALYSIS:

RECLAMATION PLAN

HYDROLOGIC INFORMATION

Regulatory Reference: 30 CFR Sec. 784.14, 784.29, 817.41, 817.42, 817.43, 817.45, 817.49, 817.56, 817.57; R645-301-512, -301-513, -301-514, -301-515, -301-532, -301-533, -301-542, -301-723, -301-724, -301-725, -301-726, -301-728, -301-729, -301-731, -301-733, -301-742, -301-743, -301-750, -301-751, -301-760, -301-761.

Analysis:

Hydrologic Reclamation Plan

The amendment was submitted as per Division requirements under Division Order DO-10A. The amendment makes the following assumptions:

1) The plan assumes that mine water will continue to discharge indefinitely from the mine, but that it will not need to be treated for iron. As such, the plan assumes that the existing mine-water treatment system will be removed during final reclamation and that the highwall area (where the treatment system is currently located) will be reclaimed to approximate original contour. Additionally, the plan addresses the seep water that currently discharges from the highwall sandstone ledge. The plan proposes the use of a backdrain system to capture the seep water and ensure the stability of the reclaimed slope.

2) The amendment also revises the reclamation plan to address the upper portion of the pad that will remain un-reclaimed due to the Emery County Crandall Canyon Memorial.

It should be noted that the existing reclamation plan calls for the re-establishment of the approximate original contour in the highwall area (as the amendment discusses as well). The significant difference in the recently submitted reclamation plan versus the existing plan is the mine-water discharge from the portals. Division Order DO-10A directed the Permittee to provide a final reclamation plan that takes the discharge into account. Historically, the flow values provided by the Permittee have averaged approximately 500 gallons per minute (gpm). However, mine-water discharge flows have been recorded over 1,000 gpm.

The Permittee discusses the proposed reclamation plan in Appendix 5-22, Crandall Canyon Mine Site Reclamation Plan. As discussed previously, the reclamation plan acknowledges that the mine-water will continue to discharge indefinitely from the mine from the portal collection pipes, the old works French drain and the saturated sandstone ledge. The

proposed reclamation plan proposes to handle the long-term discharge components of the site in the following manner:

1) Backfill the portals, leaving the existing collection piping system in place. The existing collection system utilizes 10" heavy PVC pipe extending into the seals in all four portals. Additional 4" pipes collect seepage water outside the seals which is contained behind check dams constructed within the portals themselves. All of the piping is buried and was installed with plans to be part of a permanent post-reclamation discharge system. Upon final reclamation, the portals will be completely backfilled, leaving the stub of pipe exiting to the re-contoured surface at its present location. Figures 5-14(a), 5-14(b) and 5-14(c) depict plan views and a cross-sectional view of the drain pipe configuration.

2) Replace the existing exposed overland drainpipe (currently running down the hillside to UPDES Outfall 002) with an armored (rip-rapped) open channel. Upon final reclamation, the existing PVC pipe that conveyed the mine-water discharge to Outfall 002 at Crandall Creek will be replaced with an overland open channel (MD-1). The proposed location of the channel is very close to the underlying sandstone bedrock. Debris and weathered material will be removed to expose the bedrock below which serve as a permanent non-erosive channel for the mine-water discharge. In areas where the weathered overlying material is thicker (such as below the Forest Service Road), the channel will be lined with a rip-rap armor. The details of the channel are found in Appendix 7-4 and on Plates 5-16 and 5-17. On page 8 of Appendix 5-22, the Permittee states that "*There would be no other flow in this channel other than the continuos 450 gpm (average) mine discharge flow.*" The rip-rapped mine-water discharge channel will convey the water from the portal area to the Forest Service road. At that point, the mine-water will be routed into an 18" cmp culvert which will convey the water into a 2nd segment of rip-rapped channel which will route the water into the reclaimed Crandall Creek stream channel.

3) Collect the seepage from the sandstone ledge with a drainrock/drainpipe system as part of backfilling the sandstone ledge area below the portals. Upon final reclamation, the sandstone ledge below the portals (a.k.a. Old Loadout Area) will be backfilled to approximate original contour. The sandstone is conveying a small but constant flow of approximately 3-5 gpm from behind the seals to the ledge outcrop below the portals. A drain system will be installed between the ledge-rock and the back-filled slope which will collect the seepage water into a single discharge pipe. The pipe will then be directed to join the main stream of the mine-water discharge. The cumulative discharge (i.e. the sandstone seepage and the mine-water) will enter into Crandall Creek at a common point. The details of the seepage collection system are provided in Figure 5-15 and Appendix 5-28.

Additional information is necessary in order to adequately address the proposed reclamation plan. Based upon a review of the proposed overland channel and associated culvert, the Permittee utilized a 10-year, 6-hour design storm event for the design of the rip-rapped mine-water channel (MD-1) and the associated culvert (MC-1). The Permittee must provide additional narrative, design information and design drawings that address how the mine-water discharge reclamation ditch (MD-1) and associated culvert (MC-1) will only accept mine-water discharge as indicated on page 8 of Appendix 5-22. From the information provided, it's unclear how additional storm-water runoff generated upland from the structures would be prevented from entering the channel and culvert conveyance system.

The Permittee must demonstrate that the 10-year, 6-hour design storm event is adequate in sizing reclamation ditch MD-1 and culvert MC-1. The 10-year, 6-hour design storm corresponds to 1.56 cfs or 700.4 gpm. The amendment indicates that the maximum flow of the mine-water discharge is approximately 700 gpm. However, Division records indicate that mine-water discharges have exceeded 1,000 gpm. The Permittee must address this discrepancy.

The Permittee must provide additional narrative, design information and design drawings for the discharge structure of the lower-most segment of reclamation ditch MD-1. Discharge structures must be designed to reduce erosion and prevent deepening or enlargement of stream channels. It's unclear from the information provided how the mine-water discharge will ultimately report to Crandall Creek (i.e. how MD-1 will tie into Crandall Creek without producing a scouring effect or additional erosion).

Findings:

The amendment does not meet the Hydrologic Reclamation Plan requirements of the State of Utah R645-Coal Mining Rules. The following deficiencies must be addressed prior to final approval:

R645-301-742.300- The Permittee must provide additional narrative, design information and design drawings that address how the mine-water discharge reclamation ditch (MD-1) and associated culvert (MC-1) will only accept mine-water discharge as indicated on page 8 of Appendix 5-22. From the information provided, it's unclear how additional storm-water runoff generated upland from the structures would be prevented from entering the channel and culvert conveyance system.

R645-301-742.300- The Permittee must demonstrate that the 10-year, 6-hour design storm event is adequate in sizing reclamation ditch MD-1 and culvert MC-1. The 10-year, 6-hour design storm corresponds to 1.56 cfs or 700.4 gpm. The amendment indicates that the maximum flow of the mine-water discharge is approximately 700 gpm. However, Division

records indicate that mine-water discharges have exceeded 1,000 gpm. The Permittee must address this discrepancy.

R645-301-744.100- The Permittee must provide additional narrative, design information and design drawings for the discharge structure of the lower-most segment of reclamation ditch MD-1. Discharge structures must be designed to reduce erosion and prevent deepening or enlargement of stream channels. It's unclear from the information provided how the mine-water discharge will ultimately report to Crandall Creek (i.e. how MD-1 will tie into Crandall Creek without producing a scouring effect or additional erosion).

RECOMMENDATIONS:

The amendment is not recommended for approval at this time.

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